MULTIMEDIA UNIVERSITY®

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2022/2023 (TERM ID 2230)

PBM0054 – MATHEMATICS

(Foundation in Business)

04 OCTOBER 2023
9.00 a.m. – 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of 2 pages with **FOUR** questions.
2. Attempt **ALL** four questions. The distribution of the marks for each question is given.
3. Please write all your answers in the answer booklet provided. All necessary workings **MUST** be shown.

QUESTION 1

a. Express the following as a single logarithm and simplify the expression.

$$log\ (5x)^2 + log\ (x^2 - 4) - log 15x^{\frac{1}{2}} - log\ (x + 2)$$

(4 marks)

b. Solve the following equations.

i. $ln(2x + 7) = ln3 - ln(x + 1)$ (7 marks)

ii. $\frac{1}{5}(2^{x^2} - 20) = -\frac{3}{4}$ (7 marks)

c. Solve the following equation by using appropriate substitution.

$$m^{\frac{2}{3}} - 2m^{\frac{1}{3}} - 8 = 0$$

(7 marks)

(Total: 25 marks)

QUESTION 2

a. Solve $\begin{bmatrix} 6 & 9 \\ -3 & 10 \end{bmatrix}\begin{bmatrix} -1 & 8 & 11 \\ 2 & 5 & -7 \end{bmatrix} - 4\begin{bmatrix} 1 & -6 \\ 4 & 8 \\ -2 & 12 \end{bmatrix}^T$. (5 marks)

b. Given

$$\begin{bmatrix} -6+p & 2 & q+3 \\ -2-r & 11 & 2s \end{bmatrix} + \begin{bmatrix} 3-2p & 5q+3 & 7 \\ 4p & 0 & 8-q \end{bmatrix} = \begin{bmatrix} 5 & t & 6q-5 \\ 2r & 11 & -35 \end{bmatrix}.$$

Find the values of p, q, r, s and t. (7 marks)

c. Solve the following system of linear equations using the inverse of coefficient matrix.

$$x + y + z = 14$$
$$x - 2y = -3$$
$$x + 2y + 5z = 27$$

(13 marks)

(Total: 25 marks)

Continued...

QUESTION 3

a. Find y' for the given functions and simplify the answers.

i. $y = -\frac{3}{\sqrt[5]{x^3}} + \frac{1}{15}x^{-10} - 9x^{-\frac{2}{3}} + \frac{1}{2}\sqrt{x}$ (5 marks)

ii. $y = (1-3x)^3(1+2x)^4$ (6 marks)

iii. $y = \frac{(x^2+2)^2}{(1-5x)^3}$ (6 marks)

b. Find an equation of the tangent line to the curve

$$f(x) = \sqrt{x} + \frac{5}{\sqrt{x}}$$

at the point $x = 4$. (8 marks)

(Total: 25 marks)

QUESTION 4

a. Find the following integrals.

i. $\int -x^{-3}\left(4x^{\frac{2}{3}} - \frac{10}{x^{\frac{5}{7}}} + \frac{1}{x^6} - 8\right)\ dx$ (6 marks)

ii. $\int \frac{(3-x^{-3})(9x^2-5)}{2x^4}\ dx$ (6 marks)

b. Evaluate the following integrals using substitution techniques.

i. $\int 12x\ \sqrt[5]{4-3x^2}\ dx$ (5 marks)

ii. $\int_1^2 \frac{7x^2-2}{(7x^3-6x)^3}\ dx$ (8 marks)

(Total: 25 marks)

End of Paper